Distributions (normal, binomial, poisson…)

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The goal is to show how to create different distributions and help those are new on R.

Distribution	| Random number	| PDF	| CDF	| Quantile
Normal	| rnorm	| dnorm	| pnorm	| qnorm
Binomial	| rbinom	| dbinom	| pbinom	| qbinom
Poisson	| rpois	| dpois	| ppois	| qpois
t	| rt	| dt	| pt	| qt
F	| rf	| df	| pf	| qf
Chi-Squared	| rchisq	| dchisq	| pchisq	| qchisq
Gamma	| rgamma	| dgamma	| pgamma	| qgamma
Geometric	| rgeom	| dgeom	| pgeom	| qgeom
Exponential	| rexp	| dexp	| pexp	| qexp
Weibull	| rweibull	| dweibull	|pweibull	| qweibull
Uniform	| runif	| dunif	| punif	| qunif
Beta	| rbeta	| dbeta	| pbeta	| qbeta
Multinomial	| rmultinom	|dmultinom	|pmultinom	| qmultinom
Hypergeometric	| rhyper	| dhyper	| phyper	| qhyper
Log-normal	| rlnorm	| dlnorm	| plnorm	| qlnorm
Logistic	| rlogis	| dlogis	| plogis	| qlogis

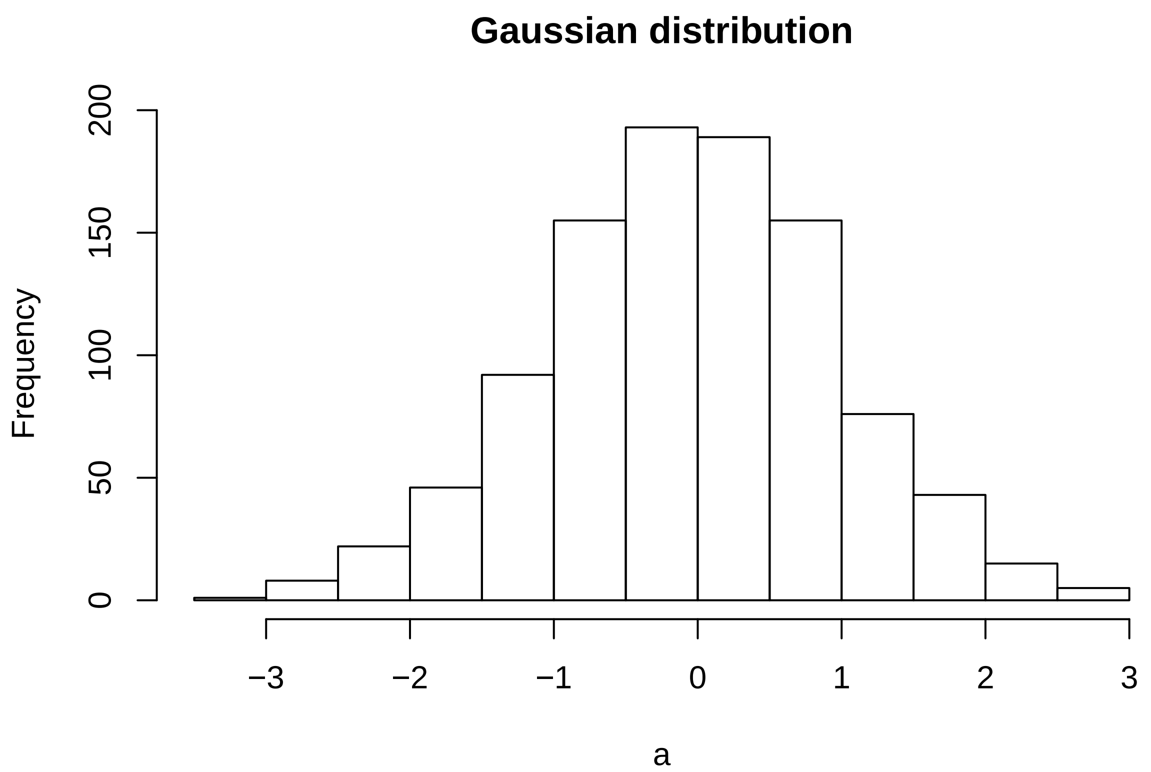
Where PDF means Probability Density Function, and CDF is Cumulative Density Function.

Normal (or Gaussian)

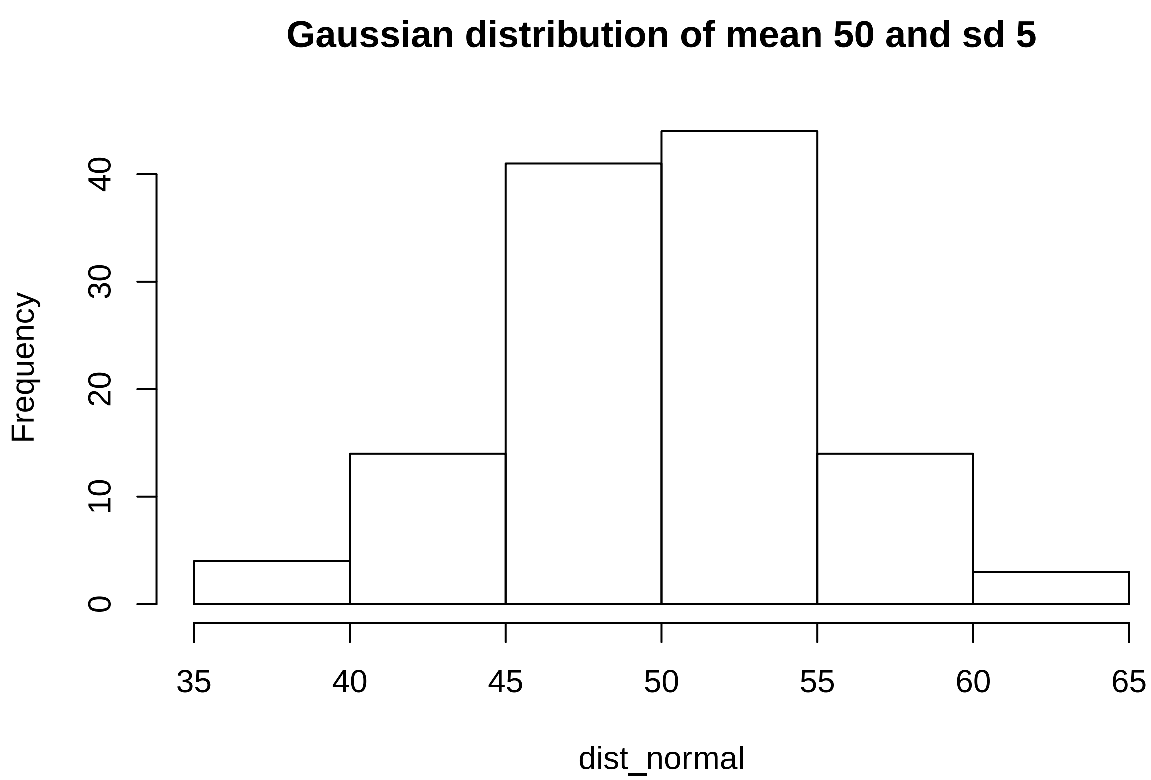
```r
# generate 10 standard normal random numbers
rnorm(10)
```

```
##  [1]  0.96252937 -2.09232687 -1.58381641 -0.31998772  0.05728371
##  [6] -0.59191907 -0.72068806  0.52476283 -0.18960077 -0.14098140
```

```r
# generate 1000 random numbers (has mean 0 and standard deviation 1)
a <- rnorm(1000)
hist(a, main ="Gaussian distribution")
```




```r
# Defining mean and standard deviation
dist_normal <- rnorm(120, mean=50, sd=5)
hist(dist_normal, main ="Gaussian distribution of mean 50 and sd 5")
```



```r
# checking the mean and standard deviation
mean(dist_normal)
```

```
## [1] 49.94348
```

```r
sd(dist_normal)
```

```
## [1] 5.042885
```

```r
# Finding a proportion (less than 2)
sum(a < 2)/1000
```

```
## [1] 0.98
```

```r
# or using Cumulative Density Function (CDF) --> gives the area under curve
pnorm(2)
```

```
## [1] 0.9772499
```

```r
# Probability Density Function (PDF) --> gives the density (height of the PDF) of the normal with mean=
densities <- dnorm(0, 1, .5)

# Quantile Function (inverse of pnorm) --> gives the value at which the CDF of the standard normal is .
qnorm(0.65, 0, 1)
```

```
## [1] 0.3853205
```

Binomial

```r
# Generate 10 binomial random numbers with parameters n = 5 and p =0.7:
rbinom(10, 5, .7)
```

```
##  [1] 4 4 5 5 3 4 4 3 3 4
```

```r
# To simulate the number of successes out of 6 trials with probability 0.4 of success,
# we run rbinom with n=1, size=6 (trial size), and prob=0.4
rbinom(1, size=6, prob=0.4)
```

```
## [1] 3
```

```r
# probability of 2 successes out of 10
dbinom(x=2, size=10, prob=0.2)
```

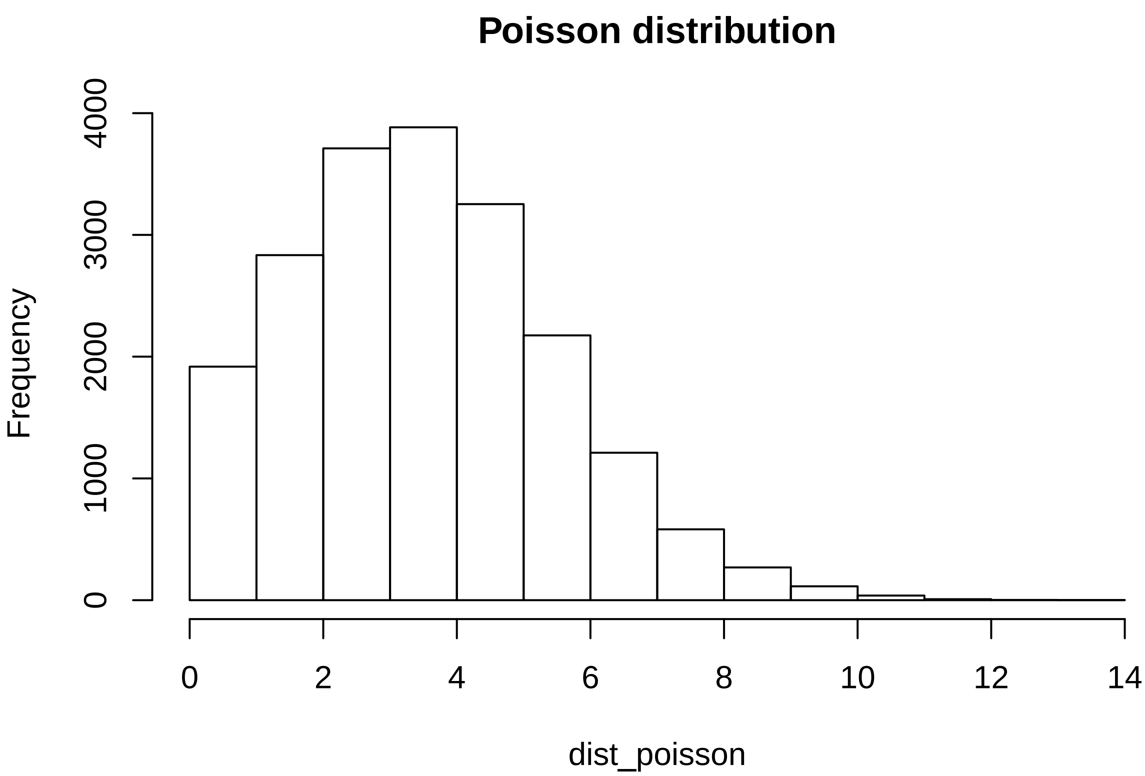
```
## [1] 0.3019899
```

```r
# probability of 2 or fewer successes out of 10
pbinom(q=2, size=10, prob=0.2)
```

```
## [1] 0.6777995
```

Poisson

```r
# Generate 20.000 Poisson random numbers with lambda = 4:
dist_poisson <- rpois(20000, 4)
hist(dist_poisson, main="Poisson distribution")
```




```r
# Estimate the mean and variance of a Poisson random variable whose mean
# is 8.2 by simulating 1.000 Poisson random numbers.
vpoi <- rpois(1000,8.2)

# check the mean and variance
mean(vpoi)
```

```
## [1] 8.058
```

```r
var(vpoi)
```

```
## [1] 8.216853
```